

Msc Botany
Semester III Internal II

Question bank paper IV: Plant tissue culture and biotechnology

I. Multiple choice questions

1. 1. Meristem culture is mainly used for:

- A. Callus induction
- B. Virus elimination
- C. Somatic hybridization
- D. Protoplast isolation

Answer: B. Virus elimination

2. The principle behind micropropagation is:

- A. Cellular totipotency
- B. Cell differentiation
- C. Genetic recombination
- D. Mutation

Answer: A. Cellular totipotency

3. Which explant is most commonly used in meristem culture?

- A. Leaf disc
- B. Root tip
- C. Shoot apical meristem
- D. Anther

Answer: C. Shoot apical meristem

4. Multiple shoot production in vitro is generally induced by:

- A. Auxins
- B. Gibberellins

C. Cytokinins

D. Ethylene

Answer: C. Cytokinins

5. Anther culture is mainly used for:

A. Triploid production

B. Haploid plant production

C. Tetraploid production

D. Hybrid seed production

Answer: B. Haploid plant production

6. The tissue cultured in pollen culture is:

A. Sporophytic tissue

B. Gametophytic tissue

C. Somatic tissue

D. Meristematic tissue

Answer: B. Gametophytic tissue

7. Haploid plants are useful in plant breeding because they:

A. Increase heterozygosity

B. Reduce mutation rate

C. Help in rapid development of homozygous lines

D. Increase polyploidy

Answer: C. Help in rapid development of homozygous lines

8. Protoplasts are plant cells:

A. Without nucleus

B. Without cell wall

C. Without cytoplasm

D. Without vacuole

Answer: B. Without cell wall

9. Enzymes commonly used for protoplast isolation include:

A. Amylase and protease

B. Cellulase and pectinase

C. Lipase and nuclease

D. Catalase and peroxidase

Answer: B. Cellulase and pectinase

10. Protoplast fusion is also known as:

A. Clonal propagation

B. Somaclonal variation

C. Somatic hybridization

D. Organogenesis

Answer: C. Somatic hybridization

11. Cryopreservation involves storage of biological material at:

A. 0°C

B. -20°C

C. -80°C

D. -196°C

Answer: D. -196°C

12. Liquid nitrogen is used in cryopreservation because:

A. It is cheap

B. It prevents contamination

C. It stops all metabolic activities

D. It increases cell division

Answer: C. It stops all metabolic activities

13. Germplasm conservation refers to:

- A. Storage of plant products
- B. Preservation of genetic resources
- C. Production of hybrids
- D. Cultivation of rare plants

Answer: B. Preservation of genetic resources

14. Micropropagation is widely applied in horticulture for:

- A. Producing genetically variable plants
- B. Rapid clonal multiplication
- C. Mutation breeding
- D. Seed dormancy breaking

Answer: B. Rapid clonal multiplication

15. One major advantage of micropropagation in forestry is:

- A. Increased genetic diversity
- B. Large-scale production of elite clones
- C. Reduced growth rate
- D. Seasonal dependence

Answer: B. Large-scale production of elite clones

16. Secondary metabolites are mainly used in:

- A. Primary metabolism
- B. Structural support
- C. Defense and medicinal applications
- D. Photosynthesis

Answer: C. Defense and medicinal applications

17. In vitro production of secondary metabolites is commonly achieved using:

- A. Callus and cell suspension cultures
- B. Seed cultures
- C. Embryo cultures
- D. Meristem cultures

Answer: A. Callus and cell suspension cultures

18. Hairy root cultures are induced by infection with:

- A. *Agrobacterium tumefaciens*
- B. *Agrobacterium rhizogenes*
- C. *Rhizobium* species
- D. *Bacillus* species

Answer: B. *Agrobacterium rhizogenes*

19. A major advantage of hairy root cultures is:

- A. Slow growth
- B. Genetic instability
- C. High and stable metabolite production
- D. Requirement of hormones

Answer: C. High and stable metabolite production

20. Hairy root cultures differ from normal root cultures because they

- A. Need cytokinins
- B. Grow slowly
- C. Are genetically transformed
- D. Cannot produce metabolites

Answer: C. Are genetically transformed

II. Fill in the blanks

1. The ability of a single plant cell to regenerate into a whole plant is called ____.

Answer: Totipotency

2. Meristem culture is primarily used for producing ____ free plants.

Answer: Virus

3. In micropropagation, rapid multiplication of shoots is promoted mainly by ____.

Answer: Cytokinins

4. The small piece of plant tissue used to initiate in vitro culture is called an ____.

Answer: Explant

5. Anther culture leads to the development of ____ plants.

Answer: Haploid

6. Pollen culture involves the culture of ____ tissue.

Answer: Gametophytic

7. Haploid plants contain ____ set of chromosomes.

Answer: Single

8. Protoplasts are plant cells devoid of ____.

Answer: Cell wall

9. Cell wall-degrading enzymes commonly used for protoplast isolation are ____ and ____.

Answer: Cellulase and pectinase

10. Fusion of two protoplasts from different species is known as ____ hybridization.

Answer: Somatic

11. Long-term storage of plant material at ultra-low temperature is known as ____.

Answer: Cryopreservation

12. The temperature of liquid nitrogen used in cryopreservation is ____ °C.

Answer: -196

13. Preservation of plant genetic resources is called ____ storage.

Answer: Germplasm

14. Micropropagation is extensively applied in horticulture for ____ multiplication of plants.

Answer: Clonal

15. In forestry, micropropagation helps in mass multiplication of ____ genotypes.

Answer: Elite

16. Secondary metabolites are mainly produced by plants for ____ and protection.

Answer: Defense

17. In vitro production of secondary metabolites is often carried out using ____ cultures.

Answer: Cell suspension

18. Hairy root cultures are induced by infection with ____.

Answer: Agrobacterium rhizogenes

19. Hairy root cultures are characterized by fast growth and ____ genetic stability.

Answer: High

20. One important industrial application of plant tissue culture is the production of ____ compounds.

Answer: Medicinal

III. One word answers

1. Biotransformation

2. In vitro hairy root culture

3. Cryopreservation

4. Ex situ conservation

5. Germplasm

6. Plant regulation

7. Micropropagation

8. Secondary metabolites

9. Protoplasts

10. Anther culture.